



DINOSAURS!

• DISCOVER THE GIANTS OF THE PREHISTORIC WORLD •

45



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DINOSAURS!

• DISCOVER THE GIANTS OF THE PREHISTORIC WORLD •



IDENTIKIT

Introducing three more great monsters of the prehistoric age

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SINGAPORE, MALAYSIA

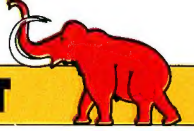
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THE MAMMOTH

Deep-frozen for thousands of years, perfectly-preserved bodies of mammoths have been dug up from the icy soil of Siberia.



With the help of these finds, scientists have put together an accurate picture of what mammoths looked like.

They have also been helped by the cave paintings which early hunters made of these elephant-like creatures.

BUILT TO SURVIVE

Mammoths varied in size but most of them were about the same height as a modern elephant. The largest of all was the North American mammoth, *Mammuthus imperator*. It grew to be the same height as a double-decker bus.

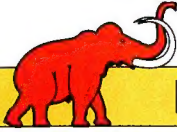
BABY MAMMOTH

By contrast, in 1977, a baby mammoth was found in eastern Russia. It had been buried over 40,000 years ago in the frozen ground. The little animal was about seven months old when it died and it nearly measured as high as an adult human's waist.

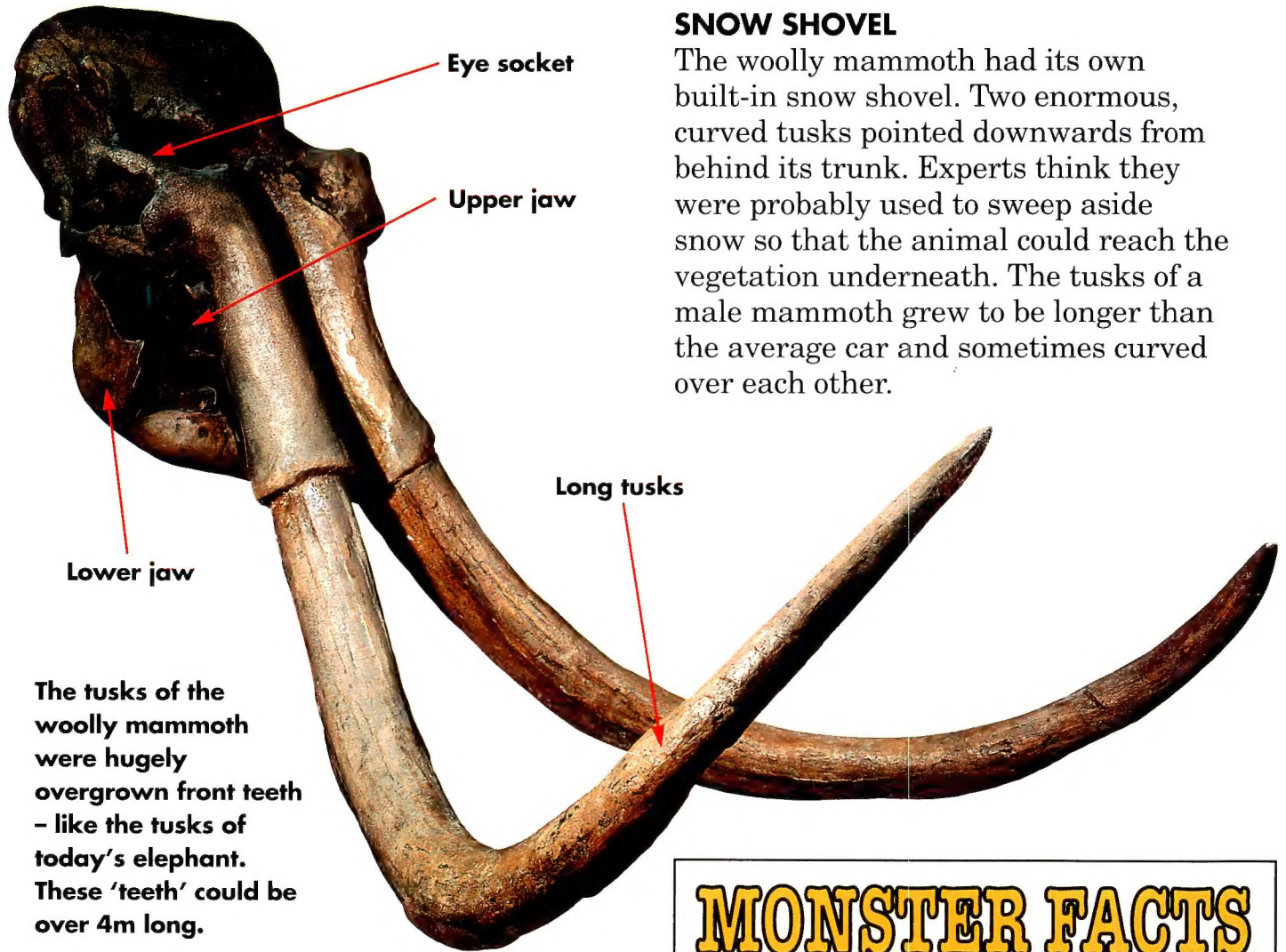
WARMLY WRAPPED

The most famous member of this extinct group of the elephant family is the woolly mammoth, *Mammuthus primigenius*. It lived in northern Europe and Russia and was brilliantly equipped to cope with the cold. Most of its body was covered with coarse, dark-brown hair that grew to 50cm in length. Beneath this it had a warm, inner 'waistcoat' of yellowish-brown fur, which grew to about the length of your little finger.





IDENTIKIT



The tusks of the woolly mammoth were hugely overgrown front teeth – like the tusks of today's elephant. These 'teeth' could be over 4m long.

FATTY LAYER

As well as its furry coat, the woolly mammoth had a deep layer of fat beneath its thick skin. This was about the same width as an adult human's wrist. The woolly mammoth also had a store of hump-shaped fat on top of its head and across its shoulders, like a camel's hump.

SMALL EARS

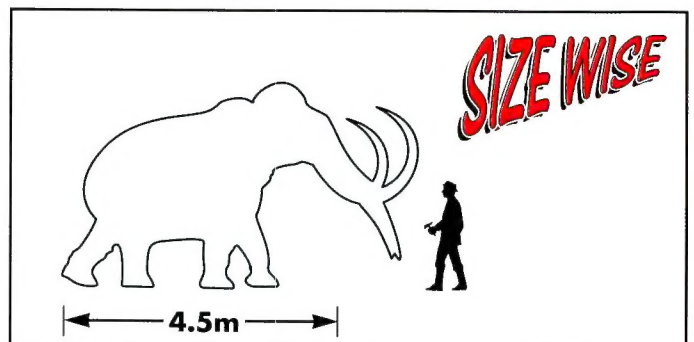
When you go out in freezing weather, your ears are one of the first places you feel the cold. That's why, compared with elephants today, the woolly mammoth had small ears. This cut down the amount of body heat lost through them, and meant the mammoth stayed warm.

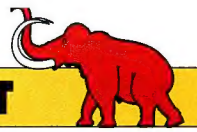
SNOW SHOVEL

The woolly mammoth had its own built-in snow shovel. Two enormous, curved tusks pointed downwards from behind its trunk. Experts think they were probably used to sweep aside snow so that the animal could reach the vegetation underneath. The tusks of a male mammoth grew to be longer than the average car and sometimes curved over each other.

MONSTER FACTS

- **NAME:** Mammoth (mam-uth)
means 'burrower'
- **SIZE:** up to 4.5m long
- **FOOD:** plants
- **LIVED:** from 5 million to 10,000 years ago in the Pliocene and Pleistocene epochs in Siberia, Russia, Europe, North America and Africa





What is? AN EPOCH

An epoch is a unit of time used by scientists to divide geological periods into smaller divisions. The Pliocene ('more recent') epoch lasted 6–2 million years ago and the Pleistocene ('most recent') epoch 2 million to 10,000 years ago. The time in which we now live is called the Holocene ('recent') epoch.

FROZEN SUPPER

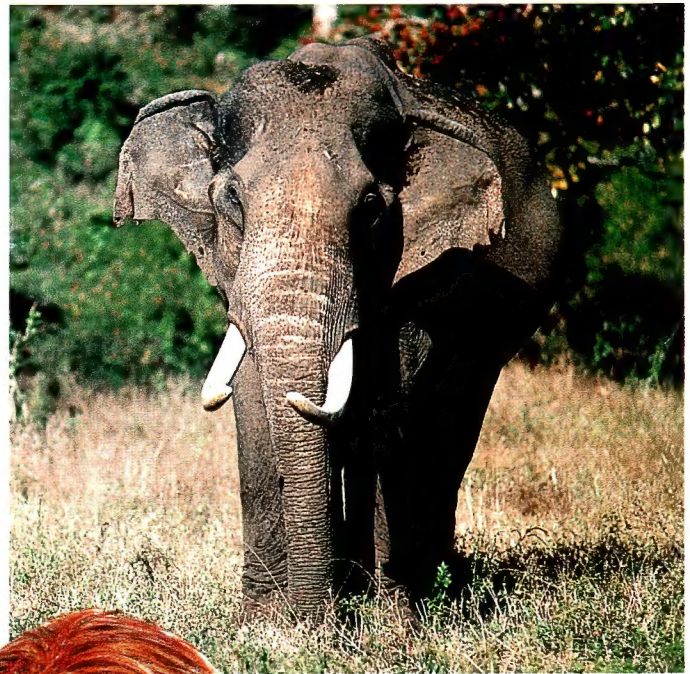
One of the frozen carcasses found at the beginning of this century showed experts what mammoths liked to eat. Inside its stomach they found grass, reeds and plants which grew on the Arctic plains. This final vegetarian supper weighed the same as about 14 bags of sugar. The mammoth chewed its food with large grinding teeth. One of those teeth would have been almost the same size as this page!

DOG'S DINNER

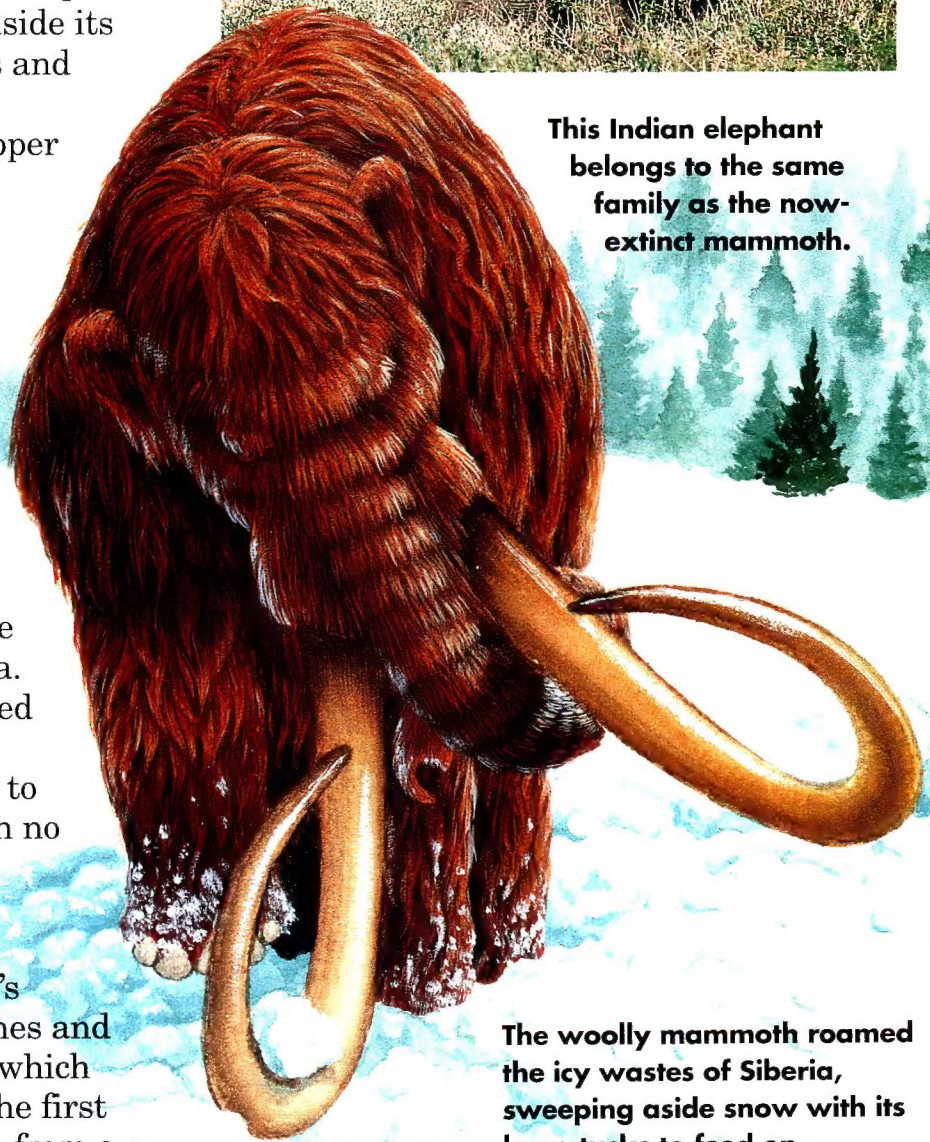
Many frozen mammoth carcasses have been found in the extremely cold climate of Siberia. The bodies were so well preserved that one group of mammoth-hunters fed the defrosting meat to their starving sledge dogs – with no bad effects!

BONE HOME

As well as eating the mammoth's meat, early hunters used its bones and tusks to make circular shelters which they covered with skins. Even the first European boomerang was made from a mammoth tusk!



This Indian elephant belongs to the same family as the now-extinct mammoth.

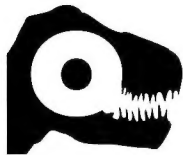


The woolly mammoth roamed the icy wastes of Siberia, sweeping aside snow with its huge tusks to feed on vegetation beneath.



STRUTHIOSAURUS

Probably the smallest of the armoured dinosaurs, *Struthiosaurus* was only about the size of a sheep.



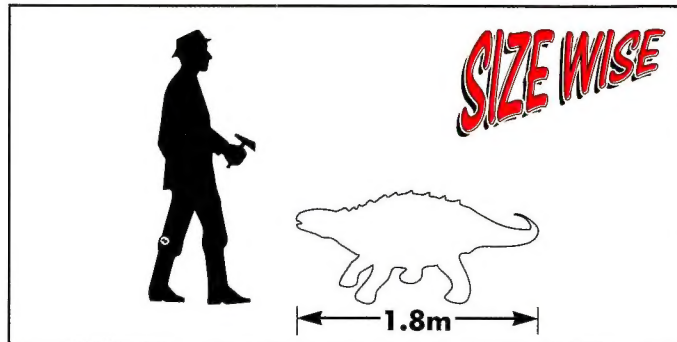
Other dinosaurs living near to *Struthiosaurus* were also very small. Experts think southern Europe once consisted of islands and island creatures are often smaller than their mainland relatives. *Struthiosaurus* was less than half the size of *Nodosaurus*.

SMALL BUT SAFE

Although small, *Struthiosaurus* was well-protected against its enemies. It had many types of armour. Sharp bony plates covered its neck, hips and tail and it had a pair of long spines on its shoulders. More spines grew out of its sides.

KEEPING A LOW PROFILE

Scurrying about on its four stumpy legs, *Struthiosaurus* ate ground vegetation, tearing off shoots with its toothless beak. It kept out of the way of predators and when attacked, probably laid low, gripping the ground to stop itself from being flipped over.

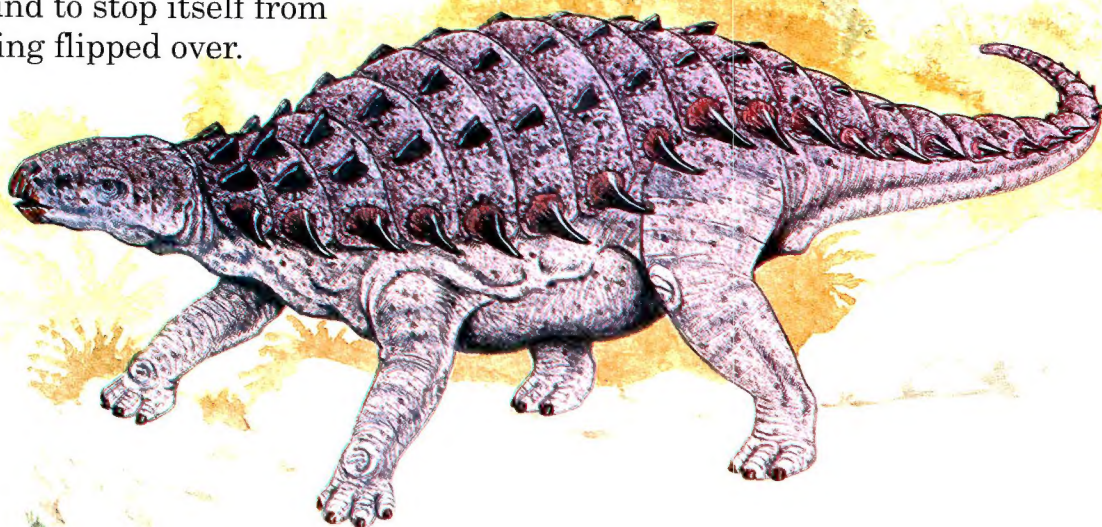


MONSTER FACTS

- **NAME:** *Struthiosaurus* (strooth-ee-oh-saw-rus) means 'ostrich reptile'
- **SIZE:** 1.8m long
- **FOOD:** plants
- **LIVED:** about 66 million years ago in southern France, eastern Austria and Romania

FROM THE LAND OF VAMPIRES

Struthiosaurus lived in France, eastern Austria, and a part of Romania once known as Transylvania. You may have heard of Transylvania as the home of the famous fictional vampire, Count Dracula! Like *Struthiosaurus*, all Transylvanian dinosaurs were small.





SHANTUNGOSAURUS

One of the biggest of the duckbilled dinosaurs, *Shantungosaurus* could peer into a second-floor window.



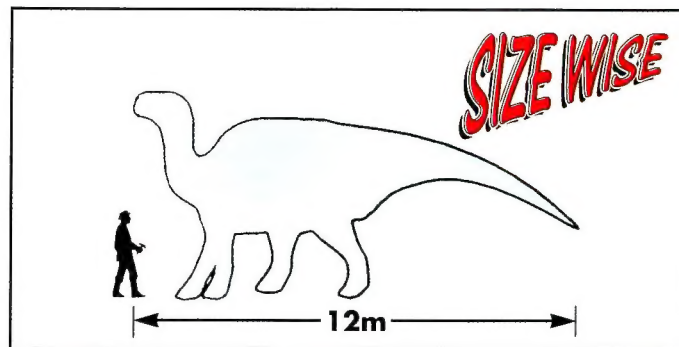
Shantungosaurus was found in Shandong, China in the early 1970s. Like many other crestless hadrosaurs, it lived near the end of the Age of the Dinosaurs when the climate was changing. *Shantungosaurus* was hardy and enjoyed eating tough vegetation like conifer needles and twigs.

SPLAYED TOES

Shantungosaurus was a heavy dinosaur and had four massive legs to support its bulky body. Its toes were spread out to give it a wide, stable base when it stood upright on two legs. At the end of its toes, hoof-like nails helped it to grip the ground firmly.

BIG MOUTH

At the front of its long, low head, *Shantungosaurus* had a wide, toothless beak. It scooped up large amounts of plants in one great mouthful and mashed them to a pulp with its strong cheek teeth.

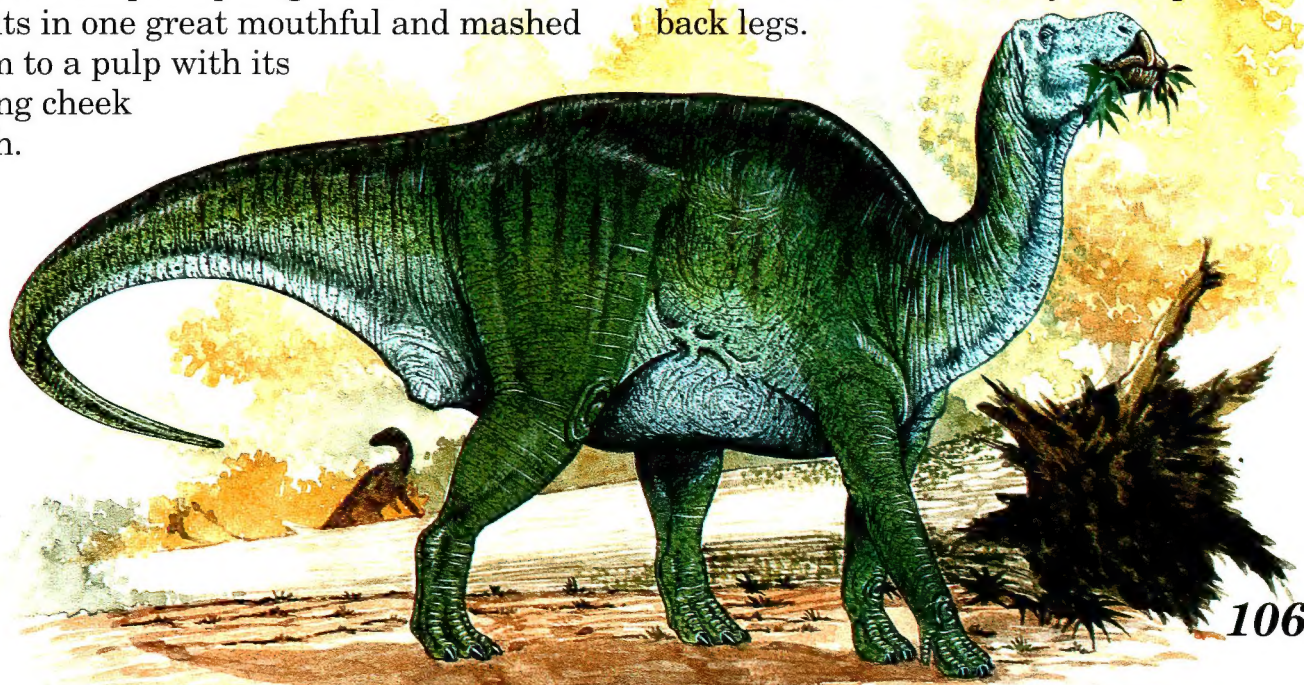


MONSTER FACTS

- **NAME:** *Shantungosaurus* (shan-doung-oh-saw-rus) means 'Shantung reptile' after Shandong in China, where it was found
- **SIZE:** up to 12m long
- **FOOD:** plants
- **LIVED:** about 75 million years ago in the Late Cretaceous Period in China

NOT A SLOUCH

Despite its size, *Shantungosaurus* could be quite nimble. At any sign of danger it could turn and run swiftly on its powerful back legs.





The beginning of
the world

PRECAMBRIAN ERA 4,800 MYA

The prehistoric timescale

A million years is about 13,000 human lifetimes. In prehistoric time, a million years passes in the blink of an eye.



Prehistory is divided into Eras, these are divided into Periods, then Epochs. Even the dinosaurs lived for only one-twentieth of the total time that life has been on Earth. How long do you think humans will last?

3,000 MYA
First life

700 MYA
The
Age of
Microbes

Amoeba

Worm

Jellyfish

The Age of Jellyfishes
and Weird Worms

PALAEOZOIC ERA 570 MYA

570 MYA

MESOZOIC ERA 245 MYA

Eoraptor

Cycad

Ginkgo

Moschops

Horseshoe
crab

Frog

TRIASSIC
PERIOD
First dinosaurs

PERMIAN PERIOD
The reptiles take over

290 MYA

Diplodocus

Archaeopteryx

Monkey
puzzle
tree

Trex

Crocodile

Pteranodon

Magnolia

Pantolambda

Taeniolabis

Zalambdalestes

JURASSIC
PERIOD
The Golden
Age of the
Dinosaurs

CRETACEOUS PERIOD
The dinosaurs flourish and die

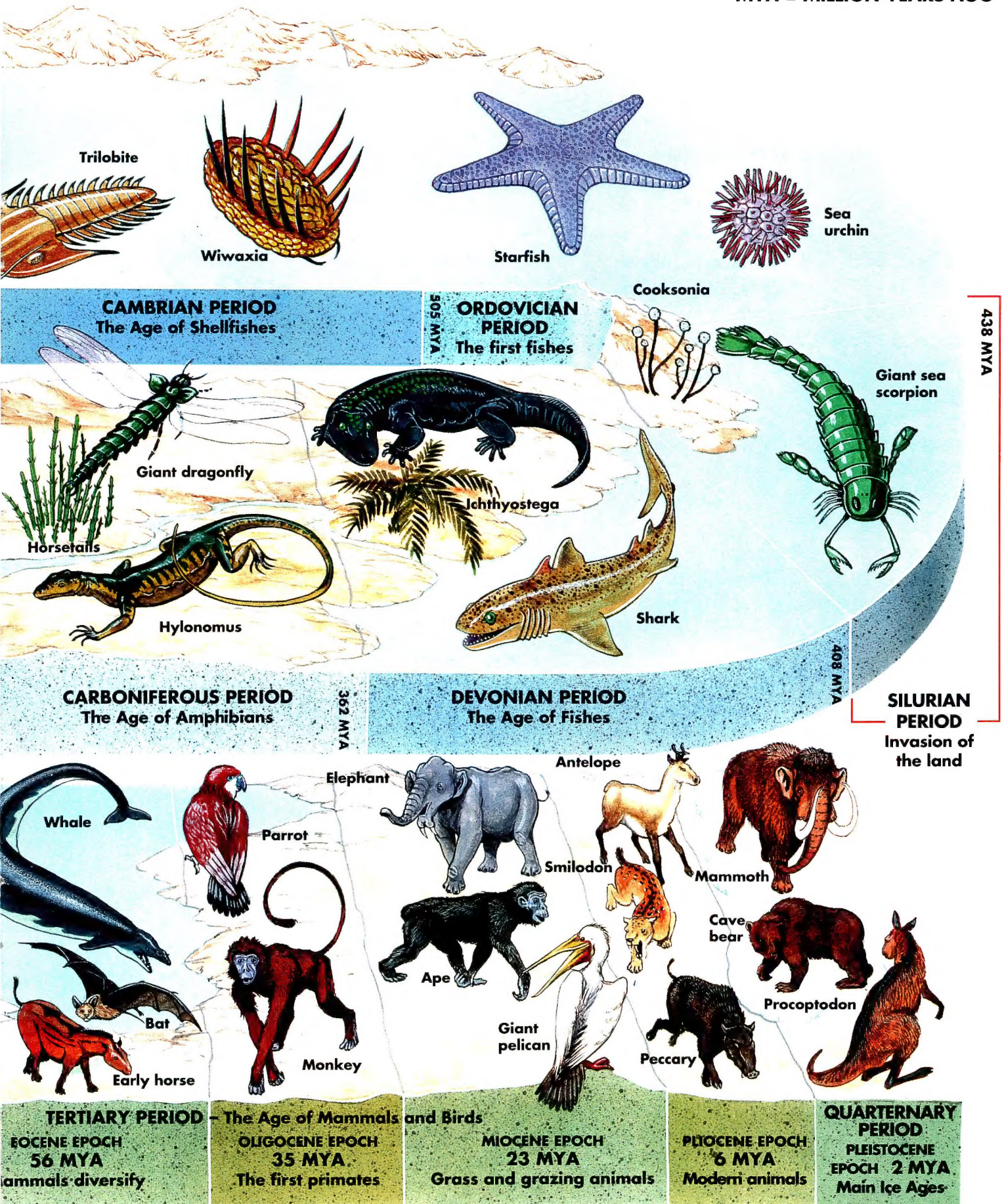
PALAEOCENE EPOCH
65 MYA
The mammals take over

145 MYA

CENOZOIC ERA 65 MYA



MYA = MILLION YEARS AGO



**PRECAMBRIAN ERA**

4,800 – 570 MYA

This immense timespan is over eight-ninths of Earth's history. Dust swirling in space collects in rocks. Water forms and falls as rain.

**Jellyfish**

Lightning sparks and thunder crashes in air that would poison us now. The first life-like chemicals appear in the water. These

become the first living things – single-celled creatures that are able to reproduce. Over millions of years, some cells come together and survive longer. They are the first many-celled life-forms – seaweeds (algae), and soft-bodied animals like jellyfishes.

PALAEOZOIC ERA

590 – 245 MYA

CAMBRIAN PERIOD

Over 500 million years ago nature had a good idea – the shell. There is an explosion of evolution in the prehistoric seas. The

**Trilobite**

earliest relatives of starfishes, crabs and sea snails crawl over the ooze. Ammonites and trilobites are common.

ORDOVICIAN PERIOD

Nature's next good idea is the backbone. First to have them are fishes, although they lack jaws or proper fins. Graptolites float in the sea. The starfishes, sea urchins and coral reefs would not look out

**The lamprey**

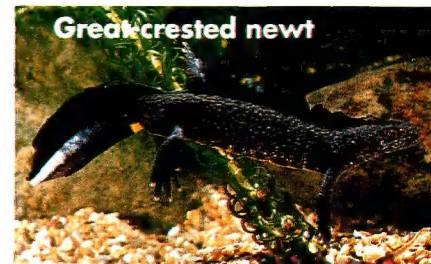
of place on today's sea shores. Soft-bodied jellyfishes and worms continue to evolve.

**Desert scorpion****SILURIAN PERIOD**

Sea arthropods (joint-legged creatures) and huge, fierce sea scorpions appear. Fishes develop jaws for eating, and scales for protection. Seaweeds continue to evolve, and their stems creep on to the land. Millipedes and early insects follow this food source. Close behind them are predatory centipedes and scorpions.

DEVONIAN PERIOD

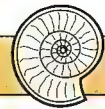
Fishes of all shapes and sizes swim through the seas. Some of them crawl on their lobe-fins out of the water and become the first backboned land animals – amphibians. The insects, already there, are feasting on the thriving new land plants. In the sea, plants, shellfishes, worms, and other life-forms thrive.

**Greatcrested newt****CARBONIFEROUS PERIOD**

Giant ferns and horsetails form warm, steamy swamps. These give shelter to the paddling amphibians.

**Jumping spider**

Spiders arrive to hunt the insects. Some insects take to the air to avoid them. Another new group of animals appears – the reptiles.



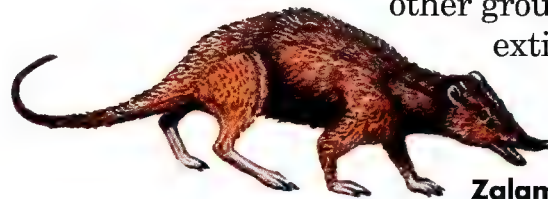
Ginkgo

PERMIAN PERIOD

Reptiles evolve rapidly into many kinds, such as the mammal-like reptiles. The first true trees – conifers and ginkgoes – tower over the land. Sharks are old-timers in the oceans. At the end of the period there is a mass extinction, one of many through prehistory. Several major groups disappear, such as the trilobites.

CRETACEOUS PERIOD

The dinosaurs, pterosaurs and sea reptiles become more specialised. Some are furry and warm-blooded. On land, flowering plants such as magnolias bring colour to the landscape. Mammals evolve into marsupial and placental groups. Dinosaurs, ammonites and many other groups become extinct.



Early mammal, Zalambdalestes

CENOZOIC ERA

ERA

TERTIARY PERIOD

Mammals and giant land birds take over the roles once filled by dinosaurs. Mammal evolution results in weird and wonderful beasts. Very soon, all the major groups that still live today, are established. Bats fly above carnivores who hunt horses, elephants and rhinoceroses. The first grasses appear, followed by great herds of deer and similar grazers. Monkeys swing in the trees.



Monkey

QUATERNARY PERIOD

Most major groups of plants and animals are as we know them today. But there is another great change. Some apes from Africa begin to walk upright, use tools, lose their fur, and get smart. Giant hairy mammoths, ground sloths and cave bears survive the Ice Ages – but are not as successful as the apes.



Mammoth

TRIASSIC PERIOD

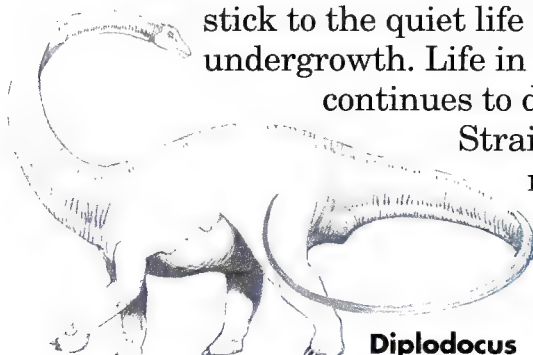
Many major groups of reptiles are established – running dinosaurs, flying pterosaurs and swimming sea reptiles, such as turtles. Frogs hop among the trunks of monkey puzzle trees. Early mammals scurry among the fronds of cycad-palms at night.



Frog

JURASSIC PERIOD

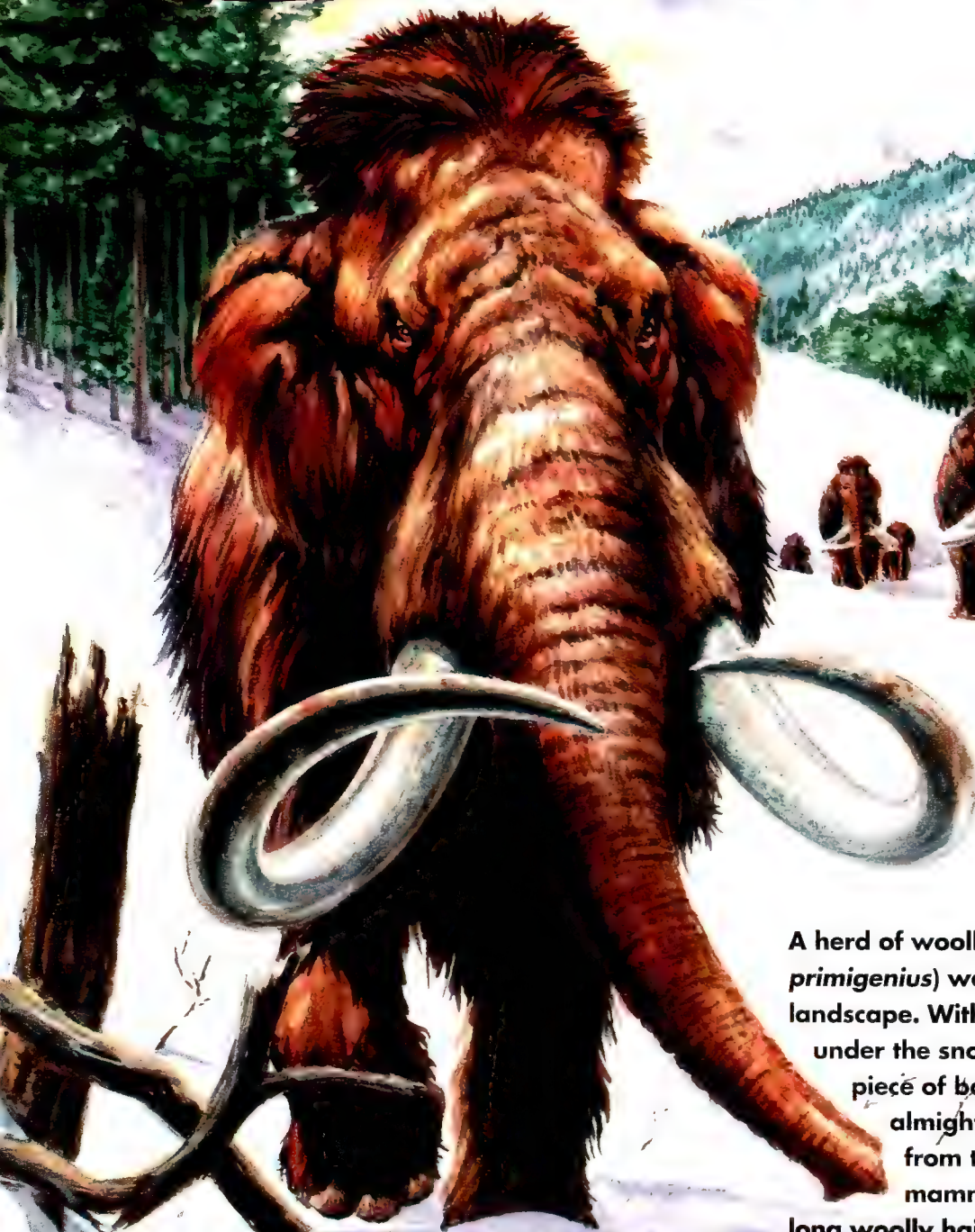
Reptiles rule on the land as dinosaurs, and in the air as pterosaurs. The first feathers appear on the first bird. Mammals stick to the quiet life in the undergrowth. Life in the sea continues to develop.



Diplodocus

Straight-shelled molluscs become curly ammonites, alongside bony fishes.

GIANTS OF THE PAST



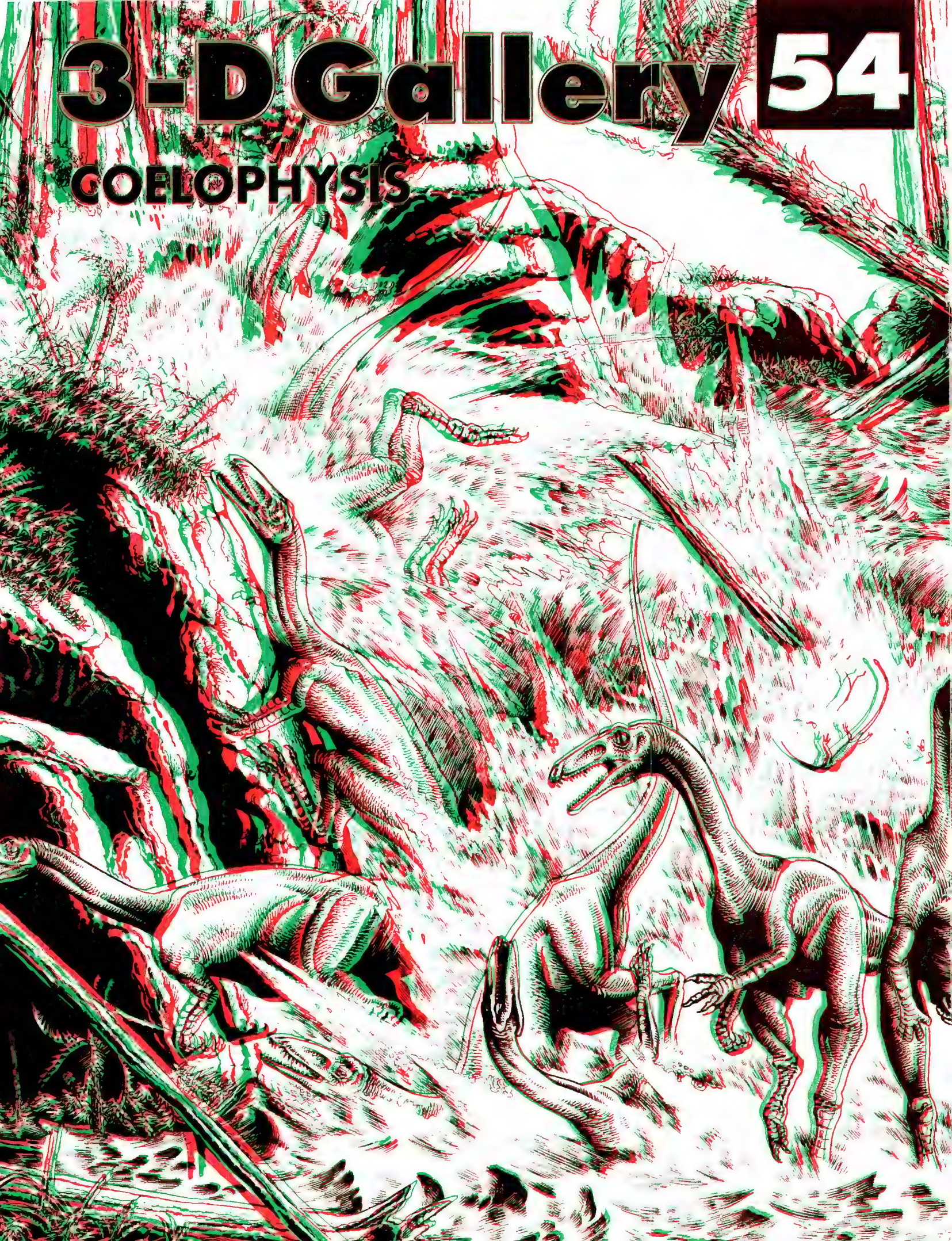
A herd of woolly mammoths (*Mammuthus primigenius*) wanders the bleak Siberian landscape. With vegetation becoming scarce under the snow, one mammoth tears at a piece of bark from a fir tree. With an almighty tug it will rip the bark from the tree and feed off it. These mammoths are used to the cold. Their long woolly hair makes a warm coat. A second layer of hair beneath this coat provides extra protection against blasts of icy air.

WOOLLY MAMMOTH



3-D Gallery 54

COELOPHYSIS



A detailed illustration of a Coelophysis dinosaur in a prehistoric forest. The dinosaur is shown in the lower left, crouching on a fallen log, looking towards the right. The forest is filled with tall, slender trees and dense foliage. A large, turbulent flash flood is depicted in the center, with water splashing and creating a sense of chaos. The scene is rendered in a style that combines realistic detail with a dramatic, almost painterly quality. The color palette is dominated by earthy tones, with highlights of green and blue. The overall composition emphasizes the scale of the flood compared to the dinosaur.

A herd of *Coelophysis* battles for survival, as a Late Triassic flash flood plunges it into peril. Despite their speed and agility, the gushing water overpowers the *Coelophysis*, making them lose their grip on rocks and trees, sending them to their death.

Life expectancy

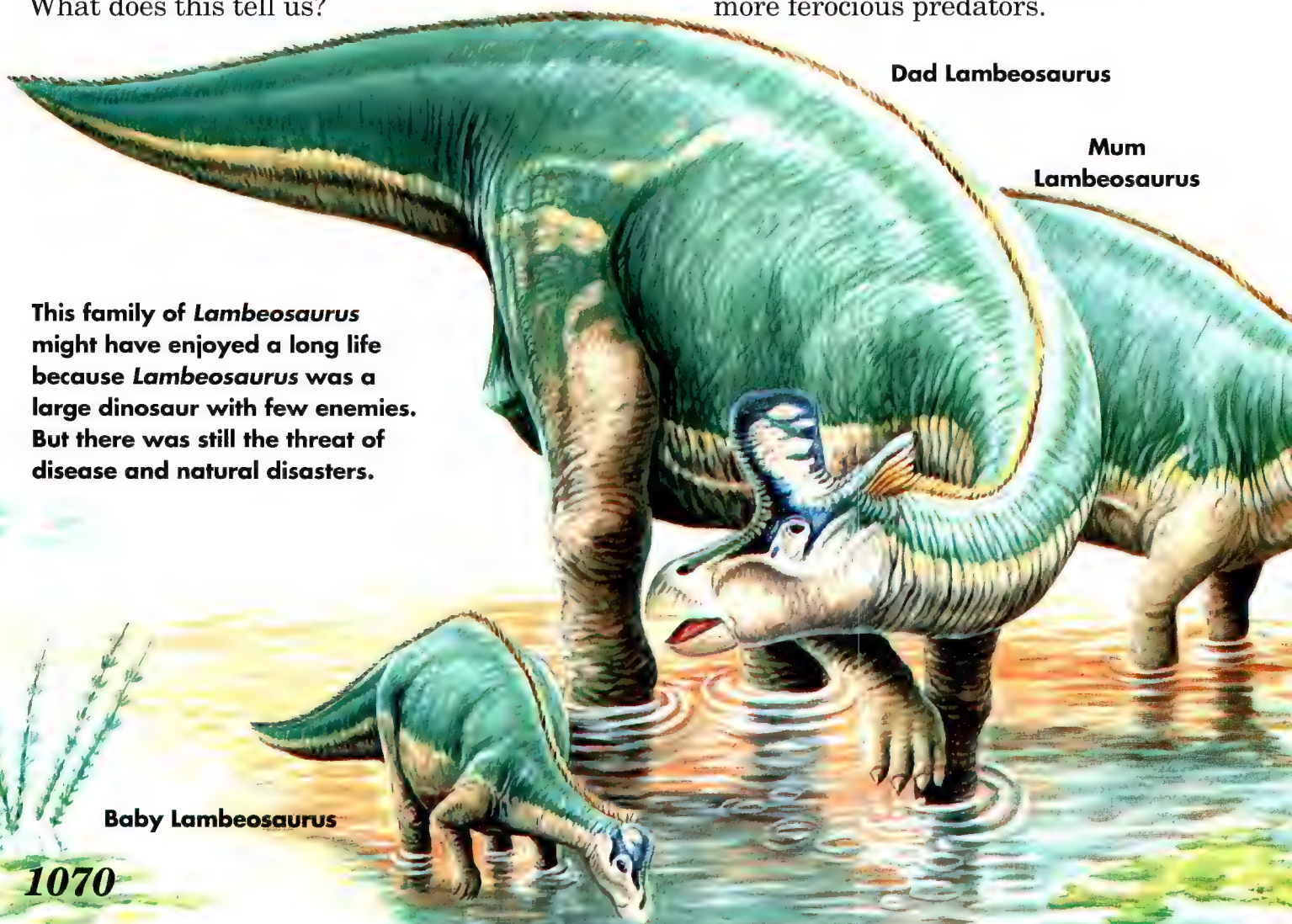
Have you ever wondered if dinosaurs lived to be very old? Or did they die when they were quite young?

Scientists can't be sure how old a dinosaur was when it died, but they can tell a lot by looking at the different life expectancies of modern animals. For example, pet dogs live up to 15 years, worker bees live for just a few months, and the huge blue whale can live for 60 years. What does this tell us?

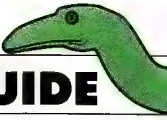


LARGEST LIVE LONGEST

In the wild, it is usually the largest animals which live the longest. This is because small animals use up more energy and are in constant danger from more ferocious predators.



This family of *Lambeosaurus* might have enjoyed a long life because *Lambeosaurus* was a large dinosaur with few enemies. But there was still the threat of disease and natural disasters.



LIVING IN SAFETY

But even large predators like lions are not always safe in the wild. It's a fact that animals tend to live longer in the safety of captivity. Dogs in the wild often die long before they reach the age of 10. So why don't animals live as long in the wild?



Safe and well cared for, a pet dog can live almost twice as long as a dog in the wild.

DANGER IN THE WILD

There are hundreds of dangers in the wild.

Even big predators get sick and die of diseases. In zoos, illnesses can be treated and broken limbs mended. But in the wild, a sick animal will struggle to survive.

NATURAL DISASTERS

A volcanic eruption, a flood or an earthquake can cause lots of animals to die at once. Thousands of fossils of dinosaurs have been found in mass graveyards, because of natural disasters.

BIG BULLIES

Often, the first-born have the best chance of survival. For example, the oldest chick in a family of magpies will grab the best bits of food from its mother, often leaving the others to starve.

DINOSAURS TOO

Perhaps this happened in dinosaur families too. Some dinosaur nests have been found with different aged babies in them, just like a magpie family. Maybe older dinosaurs grabbed the food first, leaving the smaller, weaker ones to starve.

ELDERLY DINOS?

So dinosaurs probably never died of old age. If they had to guess, experts would probably say dinosaurs lived to between 30 and 70 years old, depending on their size, and how many enemies they had.

LEG RINGS

At the moment, experts are researching an exciting new way of telling a dinosaur's age. If you count the rings inside a tree trunk, you can find out how old a tree is. Now scientists have found similar rings in the leg bones of some sauropods. No-one knows yet what these rings mean, but they may help to tell us a dinosaur's age!

IT'S A FACT

RECORD BREAKERS

Do you know which animals live longest? Man is one of them. The oldest man reached the ripe old age of 120 before he died! But even that isn't as long as the giant tortoises which can live up to 200!



Meet the running lizards

The fastest, fiercest meat-eating dinosaurs were the dromaeosaurids – the ‘running lizards’.

 These fearsome, two-legged carnivores were some of the deadliest hunters ever. They were also among the most extraordinary. They could sprint along much faster than other meat-eating dinosaurs and they killed their prey quite differently.

READY FOR BATTLE

Each running lizard was armed with a unique weapon. It had a pair of ‘switchblade’ claws on its hind feet which it could flick open when it wanted to attack its prey.

MORE THAN MAN-SIZED

The biggest running lizard was *Utahraptor* (yoo-tah-rap-tor), which experts believe grew up to 8m long.

IT'S A FACT

BAFFLED EXPERTS

When the running lizard *Deinonychus* was first discovered, experts were not sure how its hip bones fitted together. They reconstructed the skeleton with a shoulder bone in the hip by mistake!

Dromaeosaurus (above) was the first of the running lizards to be discovered, in 1914.

Growing up to 4m long, *Deinonychus* (below) towered over the child-sized *Dromaeosaurus* (bottom left) and *Velociraptor* (right).

BIG AND SMALL

Deinonychus (die-no-nike-us) was about half the size of *Utahraptor*, and grew to be up to 4m long. *Velociraptor* (vel-o-si-rap-tor) and *Dromaeosaurus* (drome-eoh-saw-rus) were both much smaller. They would have grown to only about 1.8m long. Both dinosaurs were probably no taller than a 10-year-old child.

FAMILY FACTS

It was in 1914 that scientists found a few fossil bones of a new dinosaur which they called *Dromaeosaurus*. Then an amazing sickle-shaped claw was found from another new dinosaur, called *Velociraptor*. In 1964, experts found several, almost complete

skeletons of a third dinosaur, *Deinonychus*, which was clearly related to *Dromaeosaurus* and *Velociraptor*. Scientists realised all three

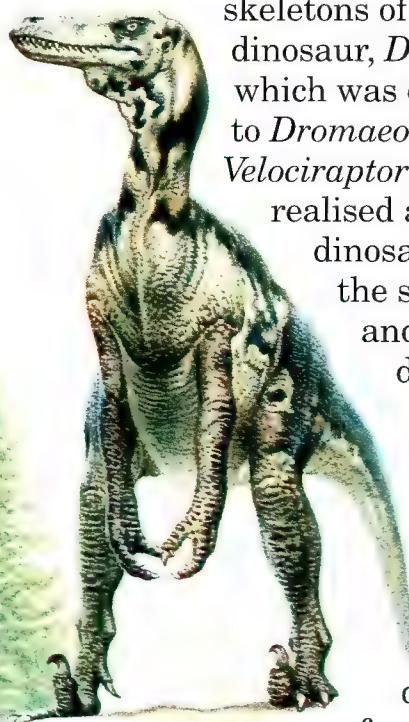
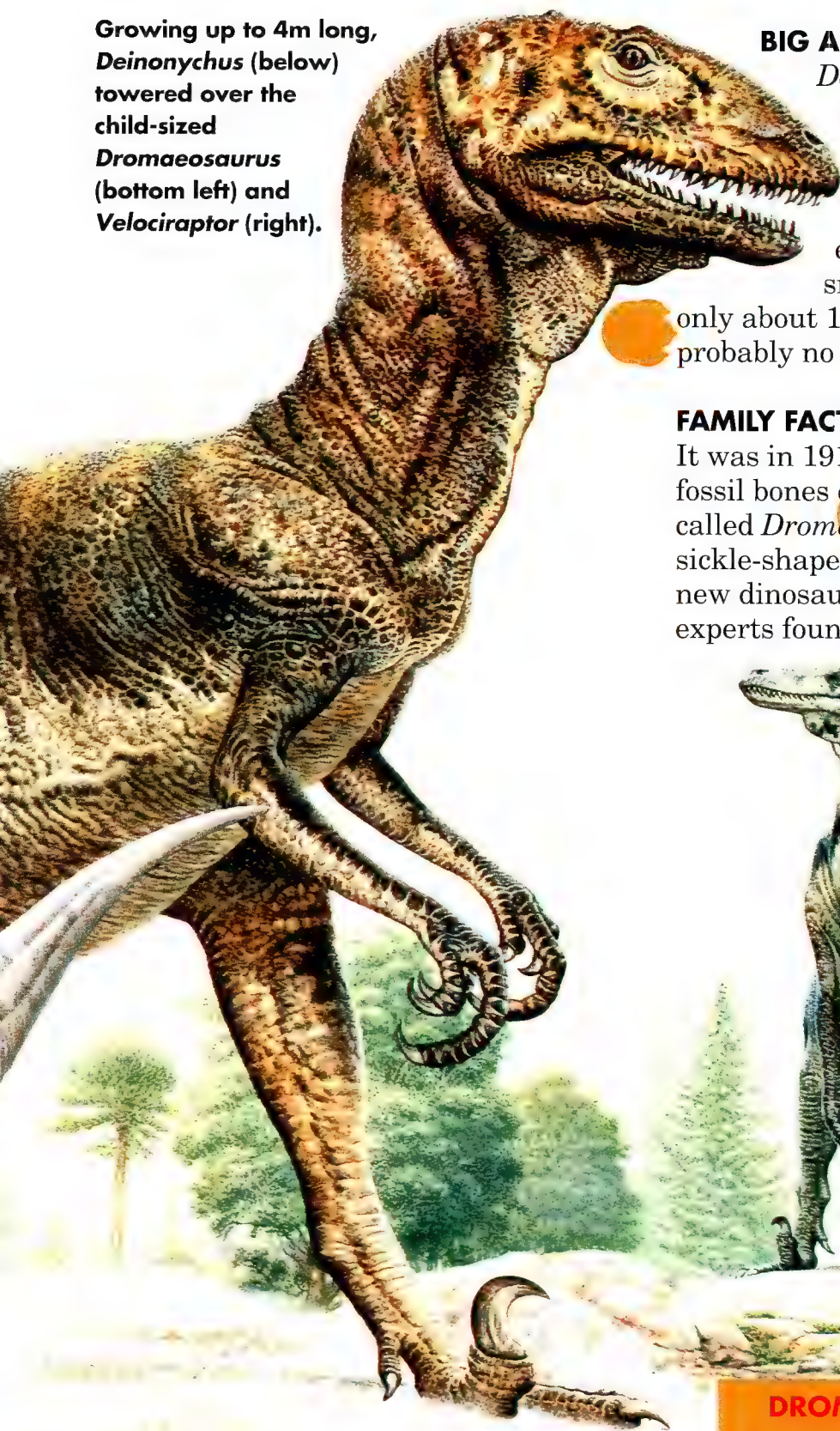
dinosaurs came from the same family, and called them dromaeosaurids after the first of the three dinosaurs they had discovered.

Utahraptor was the last dinosaur in the family to be found, in 1992. It was almost twice the size of *Deinonychus*.

DROMAEOSAURID CHECKLIST

- Switchblade claws
- Killer kick
- Stiffened tail

The running lizards were swift runners and deadly hunters.



FEW BONES

Only a few bones of *Utahraptor* were discovered in 1992, so scientists are still learning about this dinosaur. But they do know that when *Utahraptor* stood straight, it was probably the height of two tall men.

FEROCIOUS FANGS

The running lizards had powerful jaws and sharp, saw-like teeth, which gave them a fearsome bite. The teeth curved backwards as they bit into their prey, helping them to tear off larger chunks of meat.

Dromaeosaurus had a narrow hinge of bone just behind its eyes. Experts think this might have acted like a shock absorber to stop the dinosaur from jarring its brain when it snapped its powerful jaws shut.

GRAPPLING HOOKS

Running lizards had extra-long arms which ended in powerful, three-fingered hands with sharply-curved talons. Other meat-eating dinosaurs had short arms because they held their prey close to them to bite it. But running lizards like *Utahraptor* attacked with slashing kicks. They used their hands like powerful grappling hooks to hold their prey at arm's length. Then they killed it by kicking hard with their savage hind claws.

KILLER KICK

Utahraptor may have had a special leg muscle to make it kick even harder. Experts spotted an unusual ridge on one of *Deinonychus*' bones which might have had such a special muscle attached to it.

DROMAEOSAURID CHECKLIST

- Ate meat
- Walked on two legs
- Moved very fast



Using its ferocious fangs and sharp talons, *Utahraptor* got a deadly grip on its prey.

A special leg muscle would have given *Utahraptor* a brutal kick.

Utahraptor was the biggest of the running lizards, growing up to 8m long.





Thin bony rods at the end of its tail helped *Utahraptor* to balance.

TOUGH TAIL

The running lizards also had extraordinary tails. Experts have discovered that *Deinonychus* had thin bony rods near the end of its tail, so it's likely *Utahraptor* had the same design. The rods would have made the tail stiffer and probably helped balance the dinosaur as it ran along. Also, one powerful swing of its long tail would have spun the dinosaur round when it was at full gallop.

SLASHING CLAW

The running lizards were armed with the most extraordinary weapon of any of the dinosaurs. It was a huge 'switchblade' claw on the second toe of each of its hind feet. *Utahraptor* had the largest and most fearsome talons. It could raise the claws to avoid damaging them when it was running. Then it could flick them forwards when it attacked. The running lizards used their special hind claws to deliver slashing kicks that sliced deep into their prey.

TERROR TACTICS

Most meat-eating dinosaurs relied upon their powerful jaws and sharp teeth in an attack. But not the running lizards. Their main weapon was their unique hind claws.

The running lizards' unique 'switchblade' claws gave them a lethal slashing kick.

Is it true

that *Utahraptor* could move its hands like us?

Probably. Experts have discovered that *Deinonychus* had special wrist joints. Although *Utahraptor* is only known from a few bones, it could probably turn its hands in towards each other like *Deinonychus*. Like humans, special wrist joints would have made the dromaeosaurids more efficient hunters.

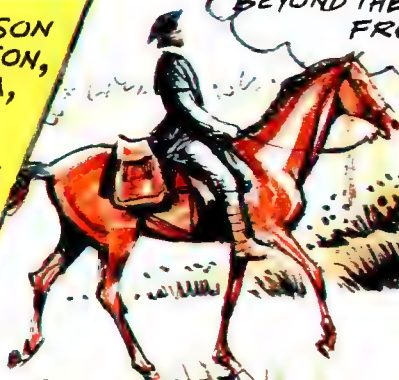


PREHISTORIC PRESIDENT

THOMAS JEFFERSON WAS A FARMER'S SON, BORN IN VIRGINIA, USA, IN 1743.

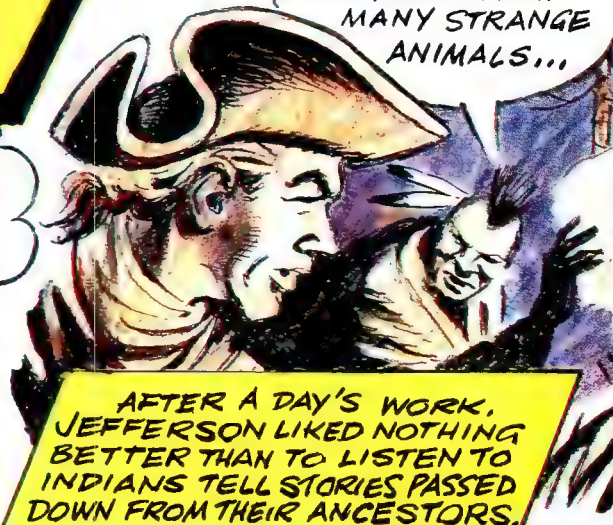
AFTER FINISHING COLLEGE HE BECAME A TRAVELLING LAWYER. OFTEN HE HAD TO TRAVEL FOR DAYS BETWEEN TOWNS.

THERE'S SO MUCH I WANT TO DO - I WANT TO FIND OUT WHAT'S BEYOND THE WESTERN FRONTIER...



THE LAND WAS FILLED WITH MANY STRANGE ANIMALS...

AFTER A DAY'S WORK, JEFFERSON LIKED NOTHING BETTER THAN TO LISTEN TO INDIANS TELL STORIES PASSED DOWN FROM THEIR ANCESTORS.



JEFFERSON BECAME GOVERNOR OF VIRGINIA, AND THEN AMBASSADOR TO FRANCE, BUT HE NEVER FORGOT THE INDIANS' STORIES. IN THE LATE 1790S, THE FOSSILS OF A LARGE, CLAWED BEAST WERE FOUND IN WEST VIRGINIA. JEFFERSON GAVE A LECTURE ON THE DISCOVERY...



GENTLEMEN - THIS IS A HUGE PREHISTORIC LION WHICH WE SHALL CALL "GREAT CLAW" OR MEGALONYX. IT WAS ONCE COMMON IN OUR COUNTRY.

IT WAS, IN FACT, AN EXTINCT TYPE OF GIANT SLOTH, BUT JEFFERSON'S LECTURE SPARKED OFF INTEREST IN AMERICA'S PAST.



CLARK'S EXPEDITION WAS A HUGE SUCCESS.

WHAT DO YOU THINK THIS IS?

LOOKS LIKE AN ELEPHANT'S LEG BONE TO ME.

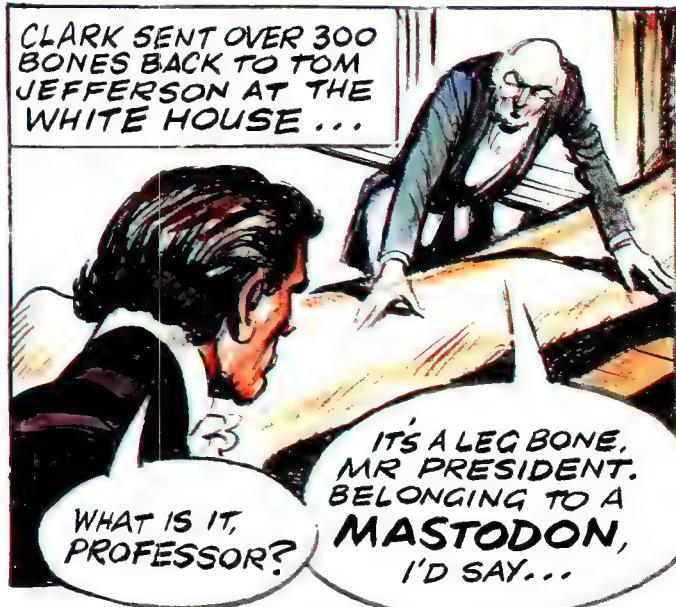
YES, BUT IT'S ENORMOUS! FAR TOO BIG FOR AN ELEPHANT!



CLARK SENT OVER 300 BONES BACK TO TOM JEFFERSON AT THE WHITE HOUSE...

WHAT IS IT, PROFESSOR?

IT'S A LEG BONE, MR PRESIDENT. BELONGING TO A MASTODON, I'D SAY...





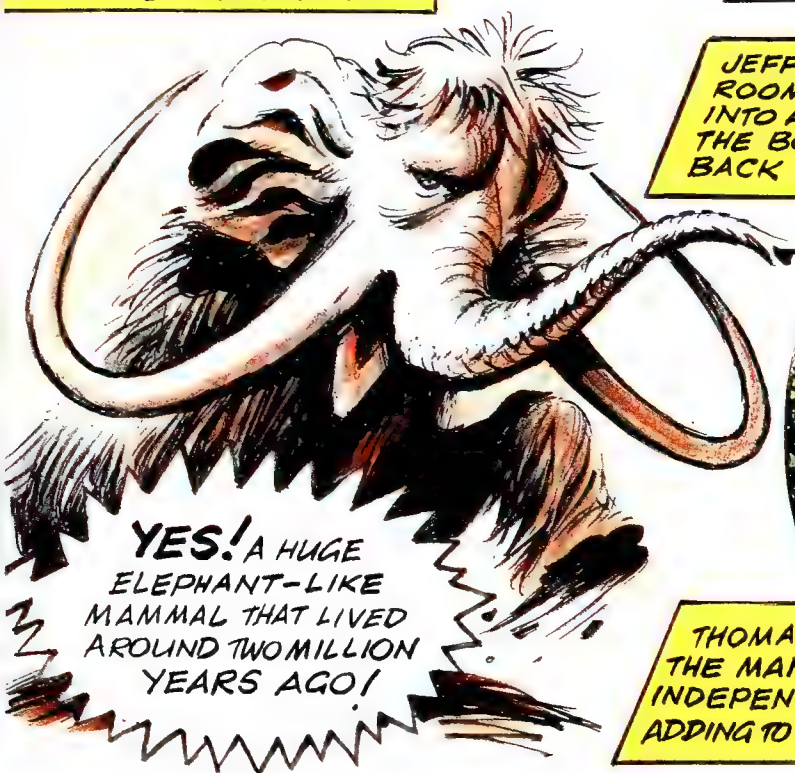
BUT BEFORE HIS DREAMS OF EXPLORING CAME TRUE, WAR BROKE OUT WITH ENGLAND. AT THE END OF THE WAR HE HELPED TO DRAW UP THE DECLARATION OF INDEPENDENCE.



IN 1801, THOMAS JEFFERSON BECAME PRESIDENT OF THE UNITED STATES. HE ASKED MERRYWEATHER LEWIS TO LEAD AN EXPEDITION TO EXPLORE THE WEST...

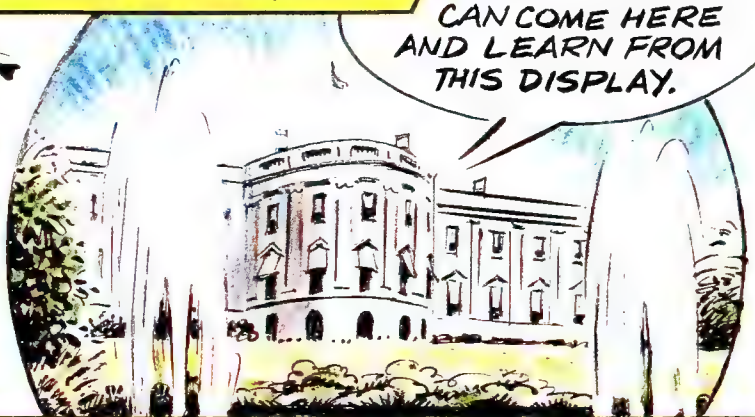
REMEMBER MERRYWEATHER, I WANT NOTES ON EVERYTHING YOU FIND!

JEFFERSON WAS IMPRESSED WITH THE FIRST EXPEDITION. HE ASKED LEWIS' DEPUTY, WILLIAM CLARK, TO HEAD A BONE-HUNTING EXPEDITION TO BIG BONE LICK, IN KENTUCKY.



JEFFERSON MADE ONE OF THE ROOMS OF THE WHITE HOUSE INTO A MUSEUM WHERE ALL THE BONES CLARK HAD SENT BACK WERE DISPLAYED.

EDUCATION IS VITAL TO OUR NATION. PEOPLE CAN COME HERE AND LEARN FROM THIS DISPLAY.



THOMAS JEFFERSON MAY BE REMEMBERED AS THE MAN WHO WROTE THE DECLARATION OF INDEPENDENCE, BUT HE ALSO PLAYED A VITAL PART IN ADDING TO OUR KNOWLEDGE OF PREHISTORIC ANIMALS.

Improve and test your knowledge with... **FACT FILE**

Follow the footprints to complete the quiz and get to the bottom of the questions!

Longest tail

Seismosaurus, known as the 'earth-shaking reptile', is believed to have had the longest tail of any dinosaur. Its entire body was probably about 36m long, and as a *diplodocid*, its whip-like tail would have been roughly half as long - about 18m.

1

Shantungosaurus had a:

- a) large jaw with jagged teeth
- b) wide, toothless beak
- c) small mouth and grinding teeth

2

Struthiosaurus was well-protected by:

- a) its armour
- b) its strong smell
- c) its tail club

3

Most adult mammoths were the size of:

- a) a Persian cat
- b) a long-haired goat
- c) a modern elephant

4

Which group of animals usually lives the longest?

- a) horses
- b) tortoises
- c) gorillas

5

Woolly mammoths kept warm because they:

- a) wore thick ear-muffs
- b) stayed indoors during winter
- c) were covered in thick hair

6

Mammals became

dominant during:

- a) the Tertiary Period
- b) the Cretaceous Period
- c) the Cambrian Period

7

The first many-celled living forms were like:

- a) jellyfishes
- b) apes
- c) crocodiles

8

What did Thomas Jefferson store in the White House?

- a) prehistoric bones
- b) frozen mammoths
- c) wild animals

9

Leg rings may tell us:

- a) how old a dinosaur was
- b) how heavy a dinosaur was
- c) what a dinosaur wore

10

Frozen remains of mammoths show:

- a) they were vegetarians
- b) they ate small mammals
- c) they ate only fish

Mass grave!

The biggest collection of mammal fossils ever found was in natural tar pits near Los Angeles, USA. Scientists discovered fossils of 4,000 animals, including mammoths, that had probably become trapped in the oily pools.



Protocetus

Feet to flippers

One of the first sea mammals to evolve was the primitive whale Protocetus. Its legs developed into flippers so it could swim in the oceans. Protocetus was a small whale measuring 2.5m. It had a long nose and pointed teeth, which were ideal for catching and gobbling small fish.

Ancient relative

There is only one known living relative of the prehistoric reptile, Tuatara. It can only be found on small islands off New Zealand. Over the past 200 million years, Tuatara has hardly changed its looks.

Dinosaur wars

While hunting for fossils in the late 1870s, the American dinosaur experts, Othniel Charles Marsh and Edward Drinker Cope, became bitter rivals. Each one tried to unearth and name more, and larger, dinosaurs than the other. The rivalry was so bad that what fossils they were unable to steal from each other, they destroyed! Despite all this fighting, the two men managed to collect and name 120 new species of dinosaur between them.

Answers to the questions on inside back cover

STOKESOSAURUS

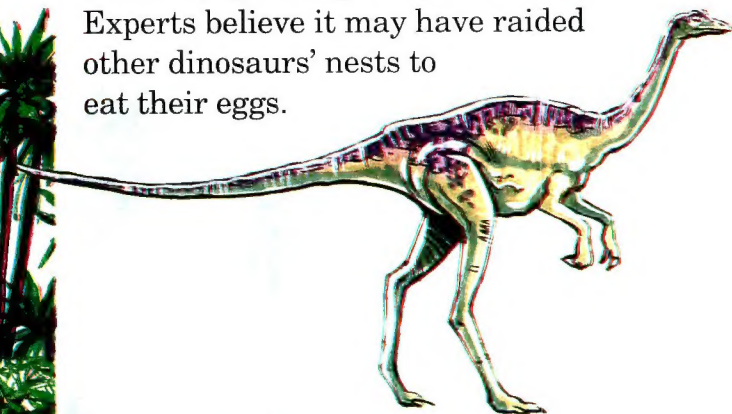
150 MYA

Stokesosaurus (stokes-oh-saw-rus) was found in the USA and named after William Stokes, organiser of a major dinosaur hunt in a quarry in Utah, USA. As long as a car, *Stokesosaurus* was a fierce predator. It chased its prey on two strong legs, tearing at its victim with long, steak-knife teeth. It lived in the Late Jurassic Period.

STRUTHIOMIMUS

75 MYA

Balanced by its long, thin tail, speedy *Struthiomimus* (stooth-ee-oh-mime-us) chased lizards and flying insects. Its name means 'ostrich mimic', because of its similarity to today's flightless bird. North American *Struthiomimus* outran most of its enemies, sprinting at up to 40km/h. Experts believe it may have raided other dinosaurs' nests to eat their eggs.



STRUTHIOSAURUS

70 MYA

Struthiosaurus (stooth-ee-oh-saw-rus) was a small, island-dwelling dinosaur. It lived near the end of the Age of the Dinosaurs and fed on low-growing plants. Although it was only 1.8m long, *Struthiosaurus* was well-protected by an armoury of spines and sharp bony plates.

STYGIMOLOCH

75 MYA

A two-legged plant-eater from Hell Creek, Montana, USA, *Stygimoloch* (stig-i-mow-lok) was named after the River Styx of Greek mythology. Only the domed skull of the dinosaur was found and this showed that it had clusters of large, elaborate horns and long spikes on either side of its head. It probably displayed these to frighten off rival males.



STYRACOSAURUS

80 MYA

Longer than two small cars, *Styracosaurus* (sty-rak-oh-saw-rus) had a magnificent crown of long spikes which stood out from a broad frill. It lived in Alberta, Canada and Montana, USA. Four-legged *Styracosaurus* had a huge nose horn which scared off big predators. Its heavy neck and body were supported by powerful muscles as it grazed on low-growing plants. *Styracosaurus* means 'spiked reptile'.



MYA = MILLION YEARS AGO

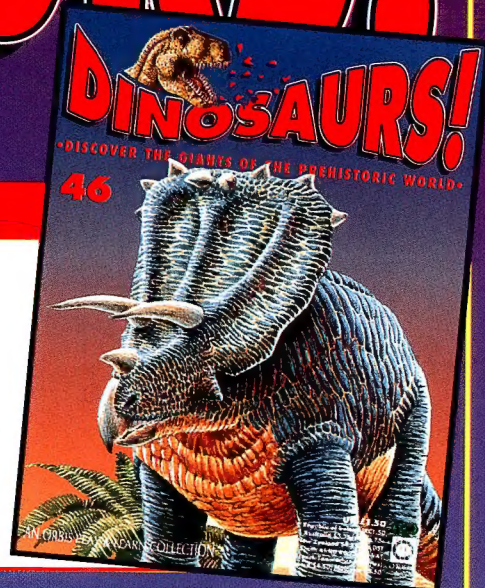
COMING IN PART 46 OF

DINOSAURS!

What was the deadly weapon used by the earliest animals on Earth? Find out in SPOTTER'S GUIDE. See how mammals survived the Ice Age in PREHISTORIC WORLD.

PLUS

Meet another three prehistoric monsters in IDENTIKIT and 3-D GALLERY HISTORY IN PICTURES GIANTS OF THE PAST



DINOSAURS! binders



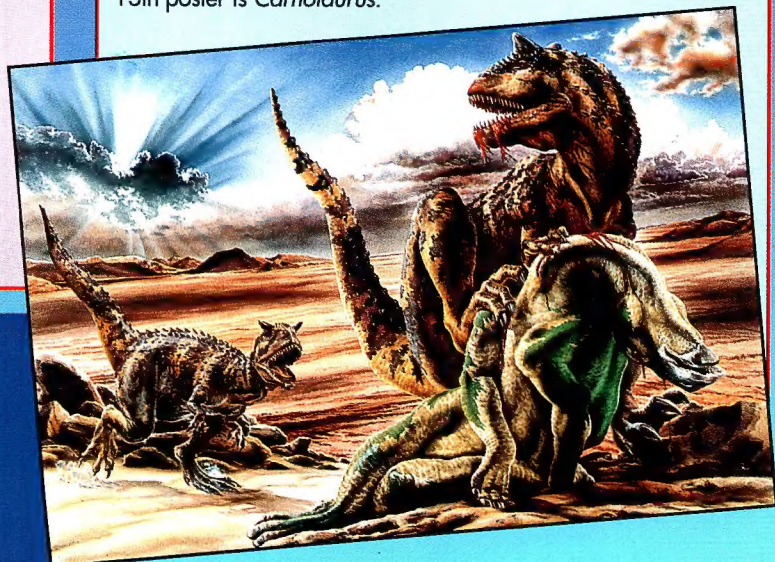
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THE DINOSAURS! POSTER COLLECTION

Have you ever wanted to fill your room with dinosaurs? Now you have your chance – with the *Dinosaurs!* POSTER COLLECTION. Each poster is 820 x 570mm (nearly eight times the size of this page) and features a superb dinosaur artwork. You'll find facts and figures about the dinosaur on the back – PLUS a look at some other prehistoric animals. The 13th poster is *Carnotaurus*.



PICTURE CREDITS: Front cover: Robin Carter/Wildlife Art Agency, Natural History Museum, London: IFC, 1058 TL; Natural History Museum/John Sibbick 1072/3; NHPA 1059 TR, 1064, 1065 TL, 1064, 1065 TL, 1070 TR, 1071 TL; Oxford Scientific Films 1071 BR.

Artwork: Black Hat 1080, Robin Bouttell/WLAA 1066/7; Robin Carter 1074/5; Barry Croucher 1057, 1059 B; Michael Donnelly 1079 TR; Deidre McHale IBC; Graham Rosewarne 1060 B, 1061 B, 1062/3, 1064 CL; Chris Turnbull/WLAA 1070 B; Steve White 1068/9; Patrick Williams 1076/7.

ANSWERS TO DINO FACT FILE QUESTIONS: 1.b 2.a 3.c 4.b 5.c 6.a 7.a 8.a 9.a 10.a



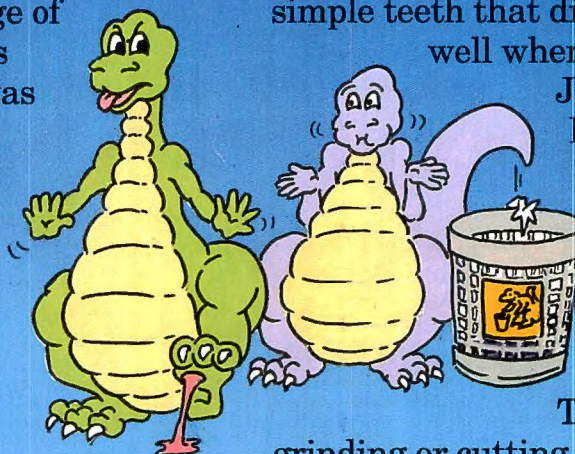
Dr. David Norman of Cambridge
University answers your
dinosaur questions

ASK THE EXPERT



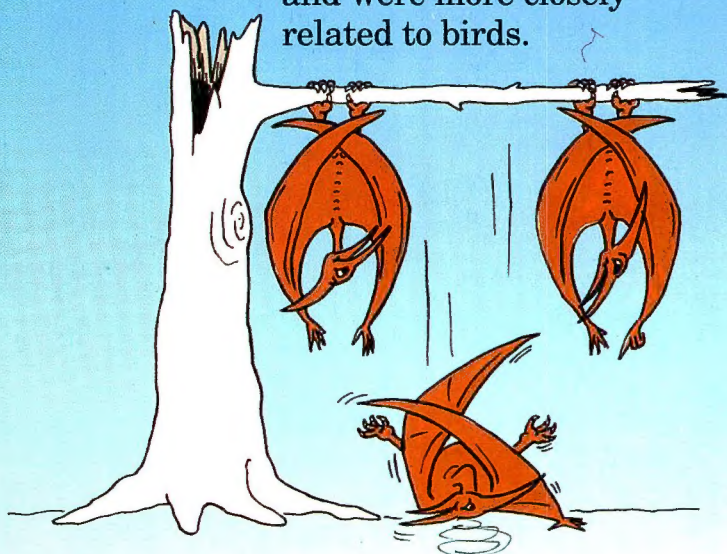
Can you identify a dinosaur from one tooth?

That depends on the type of dinosaur – some had very similar sorts of teeth. But if you know the age of the rock in which the tooth is found and where the fossil was collected, a good dinosaur detective can narrow the owner of the tooth down – just like Sherlock Holmes follows clues to a crime!



Were pterosaurs like bats?

No, not really. The wings of bats are thin and leathery like pterosaurs, but pterosaurs did not have the reversed feet of bats. Their legs and the way their wings flapped were more like those of a bird. In fact, pterosaurs both resembled and were more closely related to birds.



Did dinosaurs chew their food?

Some did, but not all of them. To chew food you need special grinding or slicing teeth and not all dinosaurs had these. Most had simple teeth that did not fit together very well when the jaws were closed.

Just a few dinosaurs, like some ornithopods and ceratopians, had hundreds of teeth that were cemented together to form what are known as 'batteries' of teeth.

These acted as either grinding or cutting surfaces and were definitely used for chewing.

Did all meat-eating dinosaurs walk on two legs?

Yes, they did, although it would probably be more correct to say 'run' on two legs. Dinosaurs could not gallop like zebras and lions can today. These use their legs and their back muscles to take huge strides and move very quickly by running on all fours. Instead, many dinosaurs developed tremendously long and powerful back legs and ran on them alone. This left them free to use their arms to grab their prey.



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